

Do Delayed Childbearers Face Increased Risks of Adverse Pregnancy Outcomes After the First Birth?

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Objective: To investigate whether the age-related risk of adverse pregnancy outcomes in the first birth persisted in the second birth, before and after adjusting for the influence of an adverse pregnancy outcome in the first birth and for other possible confounders.

Methods: Prospectively collected longitudinal data from the Swedish Medical Birth Registry ($n = 210,735$ women) were analyzed to contrast the effects of maternal age at the first birth on the risk of adverse pregnancy outcomes in the first and second successive births.

Results: Rates of adverse pregnancy outcomes were substantially higher in first than in second births. Compared with women aged 20–24, women aged 30–34 years had significantly higher odds ratios (ORs) of late fetal death (OR 1.4) and early neonatal death (OR 1.4) for the first but not for second births; women aged 35+ had a significantly higher OR of late fetal death (OR 2.2) for the first but not for second births. Women over 35 also had a significantly higher OR of early neonatal death for the first birth (OR 2.8) and less of an increase for second births (OR 1.8), a higher OR of low birth weight (LBW) for the first (OR 1.5) and second births (OR 1.6), and a higher OR of preterm birth for the first (OR 1.4) and second births (OR 1.7). Despite the strong tendency to repeat an adverse pregnancy outcome in second births, the age-related ORs did not change with adjustment for the previous pregnancy outcome.

Conclusion: Women aged 30+ at their first births have increased risks of adverse pregnancy outcomes in first births. However, second births showed no age-related increase in late fetal death and a smaller increase in early neonatal death. Increased risks for LBW and preterm birth were similar for first and second births of delayed childbearers. (*Obstet Gynecol* 1993;81:512–6)

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The number of births to women aged 30 and above has increased dramatically during recent decades in Sweden and in the United States.^{1,2} Though the focus has been on the increasing number of births among nulliparas aged 30 or older (delayed childbearers), the increase in the number of births has been even greater among women aged 30 or more with one previous birth.^{1–3} For example, in the United States from 1975–1989, the increase in the number of births among women aged 30 or more was 219,000 among nulliparas and 270,000 among women delivering their second child.^{1,3}

Several investigators have observed increased risks of adverse pregnancy outcomes among delayed childbearers.^{4–7} Whether these women also have increased risks of adverse pregnancy outcomes in successive births is not known. In the present study, we used a linked data set of two successive single births in Sweden from 1979–1989. This longitudinal approach permitted us to study whether, among women aged 30+ years who have at least two single births, the age-related risk of adverse pregnancy outcomes in the first birth persisted in the second birth, before and after adjusting for the influence of an adverse pregnancy outcome in the first birth and other possible confounders.

Materials and Methods

The Swedish Medical Birth Registry, held by the National Board of Health and Welfare, prospectively collects longitudinal data on births from all hospitals. The medical birth register covers more than 99% of all births in Sweden.⁸ This study is based on births registered in the Swedish birth register from 1979–1989 ($n = 1,090,000$). The analysis was restricted to the first two successive single births to women of a Nordic

Table 1. Rates and Odds Ratios of Late Fetal and Early Neonatal Deaths in First and Second Successive Single Births by Maternal Age at First Birth, Sweden 1979–1989

Maternal age at first birth (y)	n	First birth				Second birth			
		Rate/1000	Odds ratio			Rate/1000	Odds ratio		
			Crude	Adjusted*	95% CI		Crude	Adjusted†	95% CI
Late fetal death									
20–24	95,856	4.9	1.0	1.0		2.5	1.0	1.0	
25–29	85,570	5.3	1.1	1.1	0.9–1.2	2.7	1.1	1.1	0.9–1.3
30–34	25,319	7.0	1.4	1.4	1.1–1.6	2.9	1.2	1.1	0.9–1.5
35+	3990	10.8	2.2	2.0	1.5–2.8	2.5	1.0	1.0	0.5–1.8
Early neonatal death									
20–24		3.9	1.0	1.0		2.5	1.0	1.0	
25–29		3.5	0.9	0.9	0.8–1.04	2.2	0.9	0.9	0.7–1.1
30–34		5.4	1.4	1.3	1.1–1.6	3.1	1.3	1.3	0.97–1.6
35+		10.9	2.8	2.6	1.9–3.6	4.5	1.8	1.7	1.1–2.8

CI = confidence interval.

* Adjustments were made for hypertensive diseases, diabetes, and antepartum hemorrhage.

† Adjustments were made for hypertensive diseases, diabetes, antepartum hemorrhage, and same pregnancy outcome in first birth.

citizenship, aged 20 years or more ($n = 210,735$ women).

The rates and crude odds ratios (ORs) of late fetal death, early neonatal death, low birth weight (LBW), preterm birth, and small for gestational age (SGA) infants were estimated by maternal age at the first birth separately for first and second successive births to each woman during the 11-year period. The ORs were calculated to approximate the relative risk, with women aged 20–24 at the first birth as the reference group.

Next, we performed multiple logistic regression analyses to estimate the effect of maternal age at the first birth on the OR of late fetal death, early neonatal death, LBW, preterm birth, and SGA.⁹ In first and second births, the age-related ORs were adjusted for the effect of age-related diseases diagnosed for each pregnancy. In second births, the age-related ORs were also adjusted for the influence of previous adverse pregnancy outcomes. The Proc Logist in the SAS program package was used for the multiple logistic regression analyses.^{10,11}

Among the dependent variables in the analysis, late fetal death was defined as a stillbirth occurring at 28 weeks' gestation or later; early neonatal death occurred during the first 6 completed days of life. Low birth weight was defined as birth weight less than 2500 g. Preterm birth was defined as a birth at 36 completed weeks or less. Infants were SGA if they were less than 2 standard deviations (SDs) below the mean birth weight for gestational age according to the Swedish birth weight curve.¹² We used the date of the last menstrual period to estimate gestational age.

Maternal age was defined as age in years at delivery of the first birth and was stratified into four groups

(20–24, 25–29, 30–34, and 35+). The presence or absence of adverse pregnancy outcome for the first birth was entered as an independent variable in the multiple logistic regression analyses of the second birth.

Maternal diseases and complications during pregnancy and delivery were classified according to the International Classification of Diseases eighth revision (ICD-8) through 1986, and thereafter the ninth revision (ICD-9). They were divided into three groups for the purpose of this analysis: hypertensive diseases, defined as essential hypertension and pregnancy-induced hypertensive diseases (ICD-8 401, 637; ICD-9 642); diabetes mellitus, defined as insulin-dependent diabetes and gestational diabetes (ICD-8 250; ICD-9 250, 648.0, 648.8); and antepartum hemorrhage, defined as delivery complicated by abruptio placentae, placenta previa, or other antepartum hemorrhage (ICD-8 651; ICD-9 641). We examined the effects of these complications during each pregnancy in the respective multiple regression models.

Results

Fourteen percent ($n = 29,309$) of all women were 30 years or older at the first birth. Among women aged 30 years or more at the first birth, the mean interval to the next birth was 2.7 years. At the second birth, 35% of all women ($n = 73,608$) were 30 years or older.

The rates of late fetal and early neonatal deaths were substantially higher for every age group in first births as compared with second births (Table 1). Compared with women aged 20–24 years at the first birth, the crude and adjusted ORs for late fetal death at the first birth increased with maternal age from 30–34 to 35 years and older. In contrast, maternal age at the first

Table 2. Rates and Odds Ratios of Low Birth Weight, Preterm Births, and Small for Gestational Age Infants in First and Second Successive Single Births by Maternal Age at First Birth, Sweden 1979–1989

Maternal age at first birth (y)	First birth				Second birth			
	Rate (%)	Odds ratio			Rate (%)	Odds ratio		
		Crude	Adjusted*	95% CI		Crude	Adjusted†	95% CI
Low birth weight‡								
20–24	3.7	1.0	1.0		2.4	1.0	1.0	
25–29	3.5	0.9	0.9	0.9–0.99	2.3	1.0	1.0	0.9–1.02
30–34	4.2	1.1	1.1	1.04–1.2	2.9	1.2	1.1	1.04–1.2
35+	5.4	1.5	1.4	1.2–1.6	3.7	1.6	1.3	1.1–1.6
Preterm birth§								
20–24	5.1	1.0	1.0		3.7	1.0	1.0	
25–29	4.9	1.0	1.0	0.9–1.01	3.7	1.0	1.0	0.9–1.1
30–34	5.7	1.1	1.1	1.03–1.2	4.7	1.3	1.2	1.1–1.3
35+	7.1	1.4	1.3	1.2–1.5	6.1	1.7	1.6	1.4–1.8
SGA¶								
20–24	3.3	1.0	1.0		1.9	1.0	1.0	
25–29	2.9	0.9	0.9	0.8–0.9	1.6	0.9	0.9	0.8–0.9
30–34	3.2	1.0	1.0	0.9–1.1	1.7	0.9	0.9	0.8–0.99
35+	4.0	1.2	1.2	0.99–1.4	2.0	1.1	1.0	0.8–1.2

CI = confidence interval; SGA = small for gestational age.

* Adjustments were made for hypertensive diseases, diabetes, and antepartum hemorrhage.

† Adjustments were made for hypertensive diseases, diabetes, antepartum hemorrhage, and same pregnancy outcome in first birth.

‡ Birth weight less than 2500 g.

§ Birth at 36 weeks or less.

¶ Less than 2 standard deviations below the mean birth weight for gestational age.

birth did not influence the OR of late fetal death in the second birth. Among women aged 30 or older, the crude and adjusted ORs of early neonatal death in the first birth increased with age. Compared with women aged 20–24 years at the first birth, the adjusted OR of early neonatal death in the second birth was significantly higher among women aged 35 and older.

The rates of LBW, preterm birth, and SGA infants were consistently higher in the first births than in the second (Table 2). Compared with women aged 20–24 years at the first birth, the crude and adjusted ORs of LBW and preterm birth among women aged 30–34 were slightly higher for both first and second births. Among women aged 35+ at the first birth, the adjusted ORs of LBW and preterm delivery in the first and second births ranged from 1.3–1.6. In contrast, the influence of increasing maternal age on the OR of SGA in first and second births was very limited.

An adverse pregnancy outcome for the first birth substantially increased the risk of an adverse pregnancy outcome in the second birth (Table 3). Adjustment for the effects of maternal diseases slightly decreased the OR of a repeated adverse pregnancy outcome.

Discussion

The main objective of the present study was to contrast the risk of adverse pregnancy outcomes in first versus

second successive births to delayed childbearers. With a sample size of more than 200,000 women, we had the power to address relative and absolute age-specific risks of rare pregnancy outcomes in two successive births.

Compared with women aged 20–24 years, women aged 30 or older had increased risks of late fetal death, early neonatal death, LBW, and preterm birth in the first birth, which is in general agreement with the results of previous population-based studies.^{4,6,7} In contrast, the increased OR of late fetal death observed in the first birth did not persist in the second, and among women aged 35 or older at the first birth, the OR of early neonatal death decreased from the first to

Table 3. Odds Ratios for Repeated Adverse Pregnancy Outcome in Second Successive Single Birth, Sweden 1979–1989

Outcome in first single birth	Same outcome in second birth		
	Odds ratio		
	Crude	Adjusted*	95% CI
Late fetal death	3.1	2.7	1.4–5.2
Early neonatal death	9.7	8.7	5.4–13.9
Low birth weight	8.8	7.9	7.3–8.5
Preterm birth	5.5	5.2	4.9–5.6
SGA	8.6	8.2	7.5–8.9

Abbreviations as in Table 2.

* Adjustments were made for maternal age at first birth and for diabetes, hypertensive diseases, and antepartum hemorrhage.

second birth. The age-related crude ORs of LBW and preterm birth increased slightly from the first to the second birth. Thus, the effect of delayed childbearing (ie, the effect of advanced maternal age on pregnancy outcome among nulliparas) differs from that of advanced maternal age per se. Specifically in this study, delayed childbearing increased the risks of late fetal and early neonatal deaths, whereas increasing maternal age resulted in increased risks of LBW and preterm birth. Moreover, the disadvantage of older maternal age in second births is balanced by the advantage of generally lower rates of adverse pregnancy outcomes. Both maternal age and parity may influence uteroplacental perfusion, and the overall decreased effect of age on adverse pregnancy outcomes observed in second births is possibly due to the improved uteroplacental perfusion in multiparas as compared with nulliparas.

Most studies focusing on maternal age and pregnancy outcome are based on cross-sectional data^{4,6,7,13}, ie, the pregnancy outcomes of women at older reproductive ages are compared with pregnancy outcomes of women born later. The conditions under which the mother grew up may influence pregnancy outcome,¹⁴ and may theoretically bias the age-specific OR in cross-sectional studies. In the present longitudinal investigation, the age-specific increased ORs of late fetal and early neonatal deaths observed in the first birth disappeared or decreased in the second birth. Thus, the observed age-related OR of adverse pregnancy outcomes in first births cannot be explained on the basis of a cohort effect.

Socioeconomic factors and access to care may be unevenly distributed among women of different ages.^{15,16} Because antenatal and obstetric care is free in Sweden, compliance with the uniform national antenatal program is excellent, and practically all births are delivered in hospitals, it is unlikely that differences in access to care influenced our results.¹⁷ Nulliparas aged 30 or older are generally better educated and smoke less than younger nulliparous women, and both factors were not controlled in the present analyses.¹⁶ The present investigation included women with two consecutive single births. Delayed childbearers who gave birth to one child may differ by smoking status and educational attainment from those who gave birth to at least two children. Therefore, it is possible that we underestimated the age-related risks of adverse pregnancy outcomes.

Similar to other investigations, there was a strong tendency to repeat an adverse pregnancy outcome from the first to the second birth.¹⁸⁻²⁰ The modest decrease in the tendency to repeat adverse pregnancy outcomes after controlling for maternal diseases sug-

gests that the repeater effect is primarily mediated through variables other than maternal diseases.

Because of the increasing number of pregnant women of 30 years or more, the observed age-related risks of adverse pregnancy outcomes are an important public health issue, especially in first births. However, in counseling pregnant women, the physician should consider that the baseline rates of adverse pregnancy outcomes are generally low and the increased risks associated with maternal age are relatively modest.

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